

# Skydrol™ aviation hydraulic fluids

*Formulated to meet the changing demands of the aviation industry*



**EASTMAN**

aviation solutions

 **SKYDROL**  
HYDRAULIC FLUIDS  
from eastman



Before the invention of Type V hydraulic fluids, the aviation market offered three fluids, each approved by every manufacturer. With multiple phosphate ester fluids now available, airlines have more options than ever before when it comes to optimizing fluid use to best meet the needs of their fleets.

In some cases, one fluid can provide optimal operation for all aircraft in the fleet. However, use of two or even three different fluids to reach peak performance across a fleet is more common today. With more than 100 years of combined industry experience among Eastman's technical services team members, we are uniquely able to provide personalized expertise to support your fluid selection.

## The Eastman advantage

### Sample analysis program

- Complimentary sample bottle kits ease the process, assuring clean and safely transported samples.
- Testing is performed at company-operated labs which use methods custom designed for phosphate ester hydraulic fluids.
- Helpful analysis reports include recommendations to improve your operations and data that other fluid analysis labs don't offer.
- Fluid analysis results are reviewed by Eastman technical experts.
- This is offered at no cost to Skydrol customers, including our distributors' customers.
- MySkydrol site offers convenient access to tools, including sample kit order forms, sample results, and fleet analysis. Visit [Eastman.com/MySkydrol](http://Eastman.com/MySkydrol).

### Technical expertise

- Dedicated aviation hydraulic fluid experts skilled at solving customer problems
- Answers to questions specific to your fleets' systems
- Innovative fluid development laboratory, advancing the science of fire-resistant hydraulic fluids
- Root-cause analysis supported by our expert staff of research scientists



# What's the right Skydrol fluid(s) for your fleet?

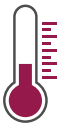
## Skydrol™ PE-5 aviation hydraulic fluid

*World's best-selling Type V aviation hydraulic fluid*

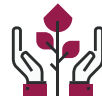
### Key benefits



**Reduced maintenance and increased performance**—longest fluid life of any phosphate ester fluid under high-moisture, low-moisture, high-temperature, and mild-temperature conditions



**Faster cold starts**—ideal combination of density (specific gravity) and low-temperature viscosity, allowing up to 25% better hydraulic system efficiency



**Reduced waste**—longer fluid life reduces volume for disposal as waste

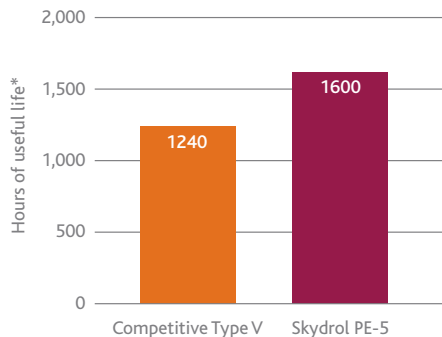


**System reliability**—offers erosion protection at 3000 and 5000 psi, allowing decreased maintenance and downtime



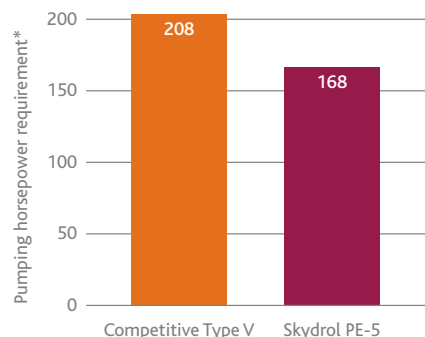
**Compatible with your fleet**—normal fluid top-up for conversion and fully compatible with existing Type IV and V fluids

### Longest fluid life



\*Fluid tested @ 257°F (125°C) and 0.5% H<sub>2</sub>O, laboratory conditions

### Low-temperature performance



\*At -65°F (-54°C) viscosity



## Skydrol™ 5 aviation hydraulic fluid

*Lighter weight and the first Type V fluid on the market*

### Key benefits



**Fuel savings**—lowest-density phosphate ester hydraulic fluid, offering weight reductions



**Paint compatibility**—less aggressive toward aircraft paints



**System reliability**—higher-temperature capability than Type IV fluids, offering thermal stability and erosion resistance



**Fire resistance**—improved fire resistance over Type IV fluids in spray ignition tests



**Safety**—base stock reduces potential health concerns

Most phosphate ester products use tributyl phosphate as a major ingredient, but Skydrol 5 has a unique formulation built on a new base stock, triisobutyl phosphate. This makes Skydrol 5 the lightest weight of any phosphate ester hydraulic fluid, allowing weight savings on the plane and fuel savings for the bottom line.

Airframe manufacturers and operators are becoming more conscious of the benefits of weight savings in today's competitive environment. Skydrol 5 sets a new standard as the lowest-density phosphate ester-based hydraulic fluid. The use of Skydrol 5 can translate into 5 to 120 lb of weight savings, depending on the aircraft model, directly leading to reduced fuel burn.

### Lower density equates to annual fuel savings.





## Skydrol™ LD-4 aviation hydraulic fluid

*World's best-selling Type IV aviation hydraulic fluid*

### Key benefits



**System reliability**—high-temperature capability offers thermal stability and erosion protection in valves



**Proven formulation**—reputation as the premier aviation hydraulic fluid, with no change in formulation since its inception more than 35 years ago



## Skydrol™ 500B-4 aviation hydraulic fluid

*Longest service history in phosphate ester products*

### Key benefits



**Proven track record**—longest service history among phosphate ester fluids



**System reliability**—contains the same breakthrough anti-erosion additive and acid scavenger found in Skydrol LD-4

## Which hydraulic fluids are approved for your fleet?

Manufacturer	Skydrol PE-5	Skydrol 5	Skydrol LD-4	Skydrol 500B-4
Airbus <sup>1</sup>	✓		✓	✓
Antonov (An-148 and 158)			✓	
ATR	✓		✓	✓
Beriev (Be-200)			✓	
Boeing <sup>2</sup>	✓	✓	✓	✓
Bombardier <sup>3</sup>			✓	✓
British Aerospace			✓	✓
Cessna		✓	✓	✓
COMAC	✓		✓	
Embraer	✓		✓	✓
Fokker		✓	✓	✓
Gulfstream <sup>4</sup>	✓	✓	✓	✓
Ilyushin (IL-86 and 96)			✓	
Lockheed		✓	✓	✓
McDonnell Douglas Corp.	✓	✓	✓	✓
Mitsubishi			✓	
SAE International	✓	✓	✓	✓
Irkut Sukhoi Superjet			✓	
Tupolev (Tu-204 and Tu-214)			✓	

<sup>1</sup>Skydrol 500B-4 is not approved in A320NEO family. Skydrol 500B-4 and LD-4 are not approved in A350 or A380. All Skydrol fluids, including Skydrol 5, are approved in A220.

<sup>2</sup>Skydrol hydraulic fluids are not approved in B787.

<sup>3</sup>Skydrol 500B-4 is not approved in Global Express.

<sup>4</sup>Skydrol 5 and Skydrol 500B-4 are not approved in G6 series.



## What physical properties does your fleet require in a hydraulic fluid?

Property	Units	Skydrol PE-5	Skydrol 5	Skydrol LD-4	Skydrol 500B-4	Test method
<b>Viscosity</b> -65°F/-54°C 100°F/38°C 210°F/99°C	cSt	1068 9.75 3.38	2085 9.23 3.13	1164 11.10 3.91	2678 11.67 3.84	ASTM D445
<b>Pour point</b>	°F °C	<-80 <-62	<-80 <-62	<-80 <-62	<-80 <-62	ASTM D97
<b>Specific gravity @ 25°C</b>	°C	0.996	0.977	1.011	1.056	Eastman 116-B
<b>Density @ 25°C</b>	g/cc lb/gal	0.9927 8.284	0.9737 8.126	1.0080 8.412	1.0532 8.789	Eastman 116-B
<b>Acid number</b>	mg KOH/g	0.03	0.03	0.03	0.03	ASTM D974
<b>Moisture content</b>	%w/w	0.07	0.07	0.07	0.07	ASTM D1744
<b>Foaming</b> Sequence 1 Sequence 2 Sequence 3	mL, sec	109, 53 54, 30 157, 59	79, 30 57, 32 81, 32	50, 25 10, 5 40, 20	100, 35 20, 15 110, 40	ASTM D892-63
<b>Particle count</b>		AS4059 Class 7 or better				SAE ARP598
<b>Specific heat</b> 38°C 93°C 120°C 149°C	cal/g/°C	0.453 — 0.461 —	0.402 0.437 — 0.472	0.437 0.472 — 0.507	0.418 0.453 — 0.487	ASTM D2766
<b>Thermal conductivity</b> 100°F 200°F 300°F	cal/(sec·cm·°C)	0.000344 0.000289 0.000263	0.000283 0.000259 0.000246	0.000326 0.000298 0.000277	0.000315 0.000299 0.000278	ASTM D2717
<b>Surface tension @ 25°C</b>	dynes/cm	29.4	—	28.2	26.7	Du Noüy balance
<b>Heat of combustion</b>	BTU/lb	13,291	13,100	13,700	13,400	ASTM D240
<b>Bulk modulus</b>	psi	235,000	210,000	231,000	242,000	BMS3-11
<b>Four-ball wear test</b> 4 kg 10 kg 40 kg	mm	0.30 0.41 0.65	0.20 0.46 0.77	0.33 0.43 0.69	0.36 0.45 0.68	ASTM D4172

## Fire-resistance properties

Property	Units	Skydrol PE-5	Skydrol 5	Skydrol LD-4	Skydrol 500B-4	Test method
<b>Flash point</b>	°F/°C	339/171	331/166	346/174	366/186	ASTM D92
<b>Fire point</b>	°F/°C	376/191	362/183	360/182	410/210	ASTM D92
<b>AIT</b>	°F/°C	796/424	871/466	877/469	957/514	ASTM D2155
<b>Hot manifold drip</b>		Does not burn in tray	Does not burn in tray	Does not burn in tray	Does not burn in tray	AMS 3150C
<b>High-pressure spray</b>		Will not ignite	Will not ignite	Will not ignite	Will not ignite	AMS 3150C
<b>Low-pressure spray</b>		No increase	No increase	No increase	No increase	AMS 3150C
<b>Wick flammability</b>		>40 cycles	>40 cycles	>40 cycles	>40 cycles	AMS 3150C

*These data are based on samples tested in the laboratory and are not guaranteed for all samples. Contact us for complete sales specifications. Does not constitute an express warranty. See disclaimer on the back of this bulletin.*

If you'd like help selecting the best fluid for your fleet, contact your Eastman aviation representative or contact us at [Eastman.com/Aviation](http://Eastman.com/Aviation).



**EASTMAN**

The results of insight™

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